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rence of sleeping sickness or for other reasons. It would have been possible by re-distribution of populations within the old Reserves, in conjunction with provision of water supplies and measures against 'fly', materially to reduce the number of people to be moved to unoccupied land. Such a course would have involved serious political repercussions and, in view of the amount of land available, it was never contemplated.

The next essential step was to survey the vacant land available for resettlement, to prepare vegetation-soil maps of the areas, and to estimate the carrying capacity of each area for the traditional agricultural system of the people who would occupy it. In the Eastern Province and the Ndola District surveys were made on the basis of parallel straight line traverses, using liquid prismatic compasses and cyclometer wheels. Traverse lines were usually one mile apart, but wider intervals up to three miles were used, in order to save time, if the country was relatively uniform or if no high degree of accuracy was required. In some instances, when very accurate maps were wanted, the traverse interval was reduced to one half or one quarter of a mile. Information on water supplies, the state of regeneration of land and timber, the former inhabitants and other relevant details, was collected in the course of these surveys. In the case of Mkushi District, where there was an abundance of available land in relation to the needs of the population, sample traverses only were used. The methods of survey and mapping are described in one of the other papers in this series.

When estimates had been made of the number of people to be moved from each of the over-crowded chieftaincies and the carrying capacity of the available land, divided into convenient areas, had been ascertained, the planning of population movements became, in theory, simple. In practice, of course, there were a good many difficulties.

Tribal boundaries and the original ownership of the land had to be taken into consideration, though these were not regarded as sacrosanct and, in fact, a large area formerly occupied by the Senga was used for the resettlement of a section of the Chewa. Other factors also limit movement. There is, obviously, a physical limit; fifty miles was regarded as the maximum practical move, but in extreme cases villages were moved as much as seventy miles. Traditional systems of land usage are, generally, adaptations to particular sets of ecological conditions and people cannot be moved into an environment unsuited to their food crops and method of production. Cattle-owning people will not willingly move to tsetse country leaving their herds behind.

Water supplies proved to be a very great difficulty over large areas, especially in the Eastern Province. Natural supplies were not sufficient to allow of full utilization of the land on the basis of its carrying capacity, and in some cases practically no settlement was possible before artificial watering points had been provided. It appeared that, in the Eastern Province at least, permanent surface water had greatly diminished in the twelve to twenty years during which the land had lain unoccupied. The old sites of villages and their sources of water supply were noted in the course of the

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surveys. In an astonishing number of cases these sites were in completely waterless country and what were stated to have been permanent streams, pools and springs had dried up. The fierce late fires which swept through the empty country each year may have been a major cause of the dessication.

§ 4. *Roads and Watering Points*

After survey had been completed and before movement into an area started, roads (generally earth tracks twelve feet wide) were constructed. These were essential in order to facilitate movements of people and their food-stocks and goods, to enable subsequent supervision and to allow of the construction of watering-points. The preliminary surveys and the maps constructed from them were invaluable in planning the road systems in relation to topography and soils, so that they would be passable throughout the year.

Wherever necessary plans were prepared in advance, also on the basis of the preliminary surveys, to provide sufficient water for the number of people to be moved into each area, and the work of constructing water points was undertaken by the Water Development Department. Water was usually provided by means of dug wells (25 to 100 feet in depth), occasionally supplemented by bore-holes, but in some areas wells were unsuccessful and earth dams were constructed. In one locality, the Mushiri resettlement area of Ndola, a particularly favourable site was used to make a large central dam which was stocked with bream (*Tilapia spp.*) in the hope of producing a fish supply for the surrounding villages. A large scale water programme was undertaken, and is still in progress, in the Eastern Province and a minor programme of some thirty wells has been completed in Ndola District where natural supplies are very much better.

§ 5. *Game and Tsetse Control*

Another difficulty was the occurance of destructive game in unoccupied country. Villages commonly objected to movement on the grounds that elephant and wild pigs would destroy the crops, an objection which often contained a good deal of substance.

Reduction of destructive game was carried out, as far as ammunition supplies and trained African staff would allow, by the Department of Game and Tsetse Control.

In the northern part of Fort Jameson District, where a few cases of sleeping sickness appeared among villages moved into a 'fly' area, a campaign of game elimination was undertaken by the Department in conjunction with the clearing of 'hard pan' (pockets of *Albizzia Harveyi* on compacting pedocal soils, generally near watercourses). These measures appear to be giving very satisfactory and rapid results and the fly has been much reduced or eliminated in areas where it was formerly abundant.

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of the Reserves to manageable proportions, leaving an excess of population, but not too great an excess, within the cattle areas.

In Petauke District, where there is ample land available, the object aimed at is a complete restoration of the population-land balance by controlled movement of some 35,000 Senga and uncontrolled movement of 8,000 Ambo and Senga-Kunda.

Survey work in the Eastern Province started in 1941 and a few pioneer villages were moved in that year, but the main movement started in 1942 (when over 18,000 people were moved) and it is still in progress. By the end of 1945 the programme was more than half completed; 292 villages (about 32,000 people) had been moved into controlled 'village blocks' or 'parish settlements' in addition to uncontrolled or partially controlled movements in the escarpment area and parts of the Fort Jameson District. The comparatively slow rate of progress is due to water-shortage. Large areas in Petauke District and the north of Fort Jameson have not yet been settled for this reason, while in the latter area there is also some danger of sleeping sickness, and measures for the control of 'fly' (game destruction and clearing of 'hard pan') are in progress. Settlement is continuing at the rate set by provision of water supplies and the control of tsetse.

The Mkushi District presents an entirely different picture since the available land is about twice as much as the present population require, on the basis of their traditional agricultural practice. Here, instead of village blocks, comparatively large areas have been demarcated to take a number of villages and there is no strict control. The Superior Native Authority has introduced rules intended to bring about a gradual conversion from small *circle chitemene* (a primitive form of axe-agriculture) to hoe cultivation of kaffir corn with subsidiary gardens for a variety of crops.

The land not actually required for immediate use has not been allocated but is being held in reserve against the future needs of the African people and the Native Authorities undertake responsibility for early burning within the reserved land.

The bulk of the necessary population transfers have already been carried out.

In Ndola District also the available land is considerably greater than present needs and some is being held in reserve. Populations moved from the congested zone about the mines have been settled in village blocks and, apart from an area demarcated for immediate settlement in 1943 to relieve actual starvation, there is no uncontrolled settlement.

Movement of 120 villages, having a total estimated population of 11,775, was completed in 1945. It has since been found, however, that the population counts made by a District Officer seconded for the purpose are in fact over-estimated and a considerable number of the blocks are under-populated and further movements may be necessary.